(19) World Intellectual Property Organization International Bureau



(43) International Publication Date 13 June 2002 (13.06.2002)

PCT

(10) International Publication Number WO 02/046101 A3

(51) International Patent Classification7: H01M 4/48

3299

(21) International Application Number: PCT/CA01/01714

(22) International Filing Date: 3 December 2001 (03.12.2001)

(25) Filing Language:

English

C01G 23/00,

(26) Publication Language:

English

(30) Priority Data: 2,327,370

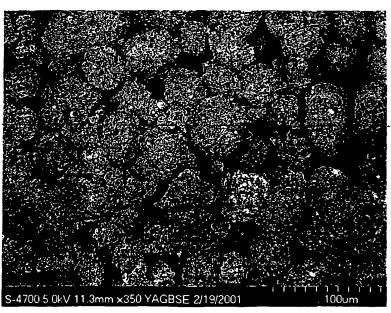
5 December 2000 (05.12.2000) C

(71) Applicants (for all designated States except US): HY-DRO-QUÉBEC [CA/CA]; 75 Boulevard René-Lévesque Ouest, Montréal, Québec H2Z 1Z2 (CA). GAUTHIER, Michel [CA/CA]; 237 rue St-Ignace, La Prairie, Québec J5R 1E6 (CA). BROCHU, Fernand [CA/CA]; 3143 Daguerre, Longueuil, Québec J4L 3B1 (CA). GUERFI, Abdelbast [CA/CA]; 8655 Boulevard Rivard, Brossard, Québec J4X 1W2 (CA). MASSÉ, Monique [CA/CA]; 3299 Matte, Longueuil, Québec J4L 4T9 (CA). AR-MAND, Michel [FR/CA]; 2965 rue Fendall, Montréal, Québec H3T 1N2 (CA).

- (72) Inventor; and
- (75) Inventor/Applicant (for US only): ZAGHIB, Karim [CA/CA]; 3672 Belcourt, Longueuil, Québec J4M 2M7 (CA).
- (74) Agents: OGILVY RENAULT et al.; Suite 1600, 1981 McGill College Avenue, Montreal, Québec H3A 2Y3 (CA).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

[Continued on next page]

(54) Title: LI₄TI₅O₁₂, LI $_{(4-\alpha)}$ Z $_{\alpha}$ TI₅O₁₂, OR LI₄Z $_{\beta}$ TI $_{(5-\beta)}$ O₁₂ PARTICLES, METHODS FOR OBTAINING SAME AND USE AS ELECTROCHEMICAL GENERATORS



(57) Abstract: The invention concerns a method for synthesising $\text{Li}_4\text{Ti}_5\text{O}_{12}$, $\text{Li}_4\text{Z}_6\text{Ti}_{(5-\beta)}\text{O}_{12}$, OR $\text{Li}_{(4-\alpha)}$ $Z_\alpha\text{Ti}_5\text{O}_{12}$ particles preferably; having spinel structure, wherein: β is greater than 0 and not more than 0.5 (preferably having spinel structure); α represents a number greater than zero and not more than 0.33, Z representing a source of at least a metal selected among the group consisting of Mg, Nb, Al, Zr, Ni, Co. Said particles coated with carbon exhibit particularly interesting electrochemical properties as anode and/or cathode component of electrochemical generators.



02/046101 A3



(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

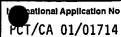
(88) Date of publication of the international search report: 19 September 2002

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

- with international search report

INTERNATIONAL SEARCH REPORT

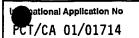


A. CLASSIFICATION OF SUBJECT MATTER IPC 7 C01G23/00 H01M H01M4/48 According to International Patent Classification (IPC) or to both national classification and IPC Minimum documentation searched (classification system followed by classification symbols) IPC 7 COIG HOIM Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practical, search terms used) CHEM ABS Data, EPO-Internal, WPI Data, PAJ C. DOCUMENTS CONSIDERED TO BE RELEVANT Category * Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim No. X,P PATENT ABSTRACTS OF JAPAN 1,4,10, vol. 2000, no. 26, 12,15, 1 July 2002 (2002-07-01) 24,33-42 & JP 2001 243950 A (TOYOTA CENTRAL RES & DEV LAB INC), 7 September 2001 (2001-09-07) abstract P,A US 2001/031401 A1 (ETO KIYOSHI ET AL) 1-42 18 October 2001 (2001-10-18) paragraphs '0006!-'0013!,'0018!-'0042!,'0065!-'0068! A EP 0 617 474 A (MATSUSHITA ELECTRIC IND CO 1-42 INC) 28 September 1994 (1994-09-28) page 3, line 45 - line 51 page 4, line 37 - line 40 page 5, line 46 -page 7, line 2 Further documents are listed in the continuation of box C. Patent family members are listed in annex. Special categories of cited documents: "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the "A" document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international "X" document of particular relevance; the claimed invention filing date cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "L" document which may throw doubts on priority claim(s) or which is clied to establish the publication date of another citation or other special reason (as specified) 'Y' document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such docu-ments, such combination being obvious to a person skilled O' document referring to an oral disclosure, use, exhibition or other means in the art. document published prior to the international filing date but later than the priority date claimed "&" document member of the same patent family Date of the actual completion of the international search Date of mailing of the international search report 28 May 2002 05/06/2002 Name and mailing address of the ISA Authorized officer European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016 Siebel, E

Form PCT/ISA/210 (second sheet) (July 1992)

1

INTERNATIONAL SEARCH REPORT



C./Continu	ation) DOCUMENTS CONSIDERED TO BE RELEVANT	PC1/CA 01/01/14						
Category Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim No.								
A,P	US 6 221 531 B1 (THACKERAY MICHAEL M ET	1-42						
	US 6 221 531 B1 (THACKERAY MICHAEL M ET AL) 24 April 2001 (2001-04-24) cited in the application the whole document							
	·							
:	· ·							

<u>IN</u>TERNATIONAL SEARCH REPORT

information on patent family members

pational Application No PCT/CA 01/01714

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
JP 2001243950	Α	07-09-2001	NONE		
US 2001031401	A1	18-10-2001	JP JP JP	2001213622 A 2000302547 A 2001213623 A	07-08-2001 31-10-2000 07-08-2001
EP 0617474	A	28-09-1994	JP CN DE DE EP KR US	6275263 A 1095191 A ,B 69404517 D1 69404517 T2 0617474 A1 9707518 B1 5545468 A	30-09-1994 16-11-1994 04-09-1997 15-01-1998 28-09-1994 09-05-1997 13-08-1996
US 6221531	B1	24-04-2001	NONE		